AMENDMENTS TO THE CLAIMS

Please cancel claims 12, 16 and 29, add claims 34-36 and amend the claims as follows:

1. (Currently Amended) A method for depositing a copper seed layer onto a substrate surface~~, wherein the substrate surface comprises~~ containing a barrier layer, comprising:

~~placing~~ exposing the substrate surface ~~into~~ to a copper solution~~, wherein the copper solution comprises~~ containing complexed copper ions and having a pH value of less than 7, wherein the complexed copper ions are derived from a copper source selected from the group consisting of copper citrate, copper borate, copper tartrate, copper oxalate, derivates thereof, and combinations thereof;

applying an electrical bias ~~to~~ across the substrate surface; and

reducing the complexed copper ions with the electrical bias to deposit the copper seed layer onto the barrier layer.

2. (Currently Amended) The method of claim 1, wherein the barrier layer ~~is~~ comprises a material selected from the group consisting of cobalt, ruthenium, nickel, tungsten, tungsten nitride, titanium, titanium nitride, and silver.

3. (Currently Amended) The method of claim ~~1~~ 2, wherein the ~~complexed~~ copper source is ~~ions are selected from the group consisting~~ copper citrate~~, copper borate, copper tartrate, copper oxalate, copper pyrophosphate, copper acetate, copper EDTA complex and combinations thereof~~.

4. (Currently Amended) The method of claim 3, wherein the copper solution contains a concentration of complexed copper ~~ions have a concentration~~ within the range from about 0.02 M to about 0.8 M.

5. (Currently Amended) The method of claim 4, wherein the electrical bias ~~is configured to~~ generates a current density ~~across the substrate surface that is~~ of less than about 10 mA/cm^2 across the substrate surface.

6. (Currently Amended) The method of claim 5, wherein the current density is within the range from about 0.5 mA/cm^2 to about 3 mA/cm^2.

7. (Currently Amended) The method of claim 6, wherein the copper seed layer has a thickness of less than about 200 Å.

8. (Currently Amended) The method of claim 7, further comprising depositing a copper gap-fill ~~copper~~ layer ~~onto the copper seed layer and wherein, depositing the gap-fill layer comprises,~~ by:

~~placing~~ exposing the substrate ~~surface into~~ to a second copper solution~~, wherein the second copper solution includes~~ containing free-copper ions; and

applying a second electrical bias ~~to~~ across the substrate surface~~; and reducing the free-copper ions with the second electrical bias~~ to deposit the copper gap-fill layer onto the copper seed layer.

9. (Currently Amended) The method of claim 8, further comprising depositing a copper bulk-fill ~~copper~~ layer ~~onto the copper gap-fill layer, wherein depositing the bulk-fill layer comprises,~~ by:

~~placing~~ exposing the substrate ~~surface into~~ to a third copper solution~~, wherein third copper solution includes the~~ containing free-copper ions; and

applying a third electrical bias ~~to~~ across the substrate surface~~; and reducing the free-copper ions with the third electrical bias~~ to deposit the copper bulk-fill layer onto the copper gap-fill layer.

10. (Original) The method of claim 9, wherein at least one leveling agent is added to the second copper solution to form the third copper solution.

11. (Currently Amended) A method for depositing a metal seed layer onto a barrier layer on a substrate surface, comprising:

~~placing the~~ exposing a substrate ~~surface into~~ to a complexed copper solution~~, wherein the solution is acidic and comprises a metal source compound and a complexing compound~~ containing complexed copper ions derived from a copper source selected from the group consisting of copper citrate, copper borate, copper tartrate, copper oxalate, derivates thereof and combinations thereof;

~~forming complexed metal ions within the solution;~~ and

reducing the complexed ~~metal~~ copper ions with an electroplating technique to form ~~the metal~~ a copper seed layer.

12. (Cancelled)

13. (Currently Amended) The method of claim 12, wherein the barrier layer ~~is~~ contains a material selected from the group consisting of cobalt, ruthenium, nickel, tungsten, tungsten nitride, titanium, titanium nitride, and silver.

14. (Currently Amended) The method of claim ~~12~~ 13, wherein the ~~complexed metal ions are selected from the group consisting metal~~ copper source is copper citrates~~, metal borates, metal tartrates, metal oxalates, metal pyrophosphates, metal acetates, metal EDTA complexes and combinations thereof~~.

15. (Currently Amended) The method of claim ~~14~~ 11, wherein the ~~metal~~ copper source ~~compound~~ has a ~~metal~~ copper concentration within the range from about 0.02 M to about 0.8 M.

16. (Cancelled)

17. (Currently Amended) The method of claim 14, wherein ~~the electroplating technique comprises~~ a bias ~~configured to~~ generates a current density ~~that is~~ of less than about 10 mA/cm^2 across the substrate surface during the electroplating technique.

18. (Currently Amended) The method of claim 17, wherein the current density is within the range from about 0.5 mA/cm^2 to about 3 mA/cm^2.

19. (Currently Amended) The method of claim 18, wherein the ~~metal~~ copper seed layer has a thickness of less than about 200 Å.

20. (Currently Amended) The method of claim 19, further comprising depositing a copper gap-fill ~~copper~~ layer ~~onto the metal seed layer and wherein, depositing the gap-fill layer comprises,~~ by:

~~placing~~ exposing the substrate ~~surface into~~ to a first copper solution~~, wherein the copper solution includes~~ containing free-copper ions; and

applying a second electrical bias ~~to~~ across the substrate surface~~; and reducing the free-copper ions with the second electrical bias~~ to deposit the copper gap-fill layer onto the ~~metal~~ copper seed layer.

21. (Currently Amended) The method of claim 20, ~~wherein~~ further comprising depositing ~~the~~ a copper bulk-fill ~~copper~~ layer ~~onto the copper gap-fill layer comprises,~~ by:

~~placing~~ exposing the substrate ~~surface into~~ to a second copper solution~~, wherein second copper solution includes the~~ containing free-copper ions; and

applying a third electrical bias across the substrate surface~~; and reducing the free-copper ions with the third electrical bias~~ to deposit the copper bulk-fill layer onto the copper gap-fill layer.

22. (Currently Amended) The method of claim 21, wherein at least one leveling agent is added to the first copper solution to form the second copper solution.

23. (Currently Amended) A method for electroplating a copper seed layer ~~to a barrier layer from a copper solution~~, comprising:

~~placing~~ exposing a substrate ~~surface comprising the~~ containing a barrier layer ~~into fluid contact with the copper solution, wherein the~~ to a complexed copper solution ~~comprises~~ containing complexed copper ions ~~and complexing compounds~~ derived from a copper source selected from the group consisting of copper citrate, copper borate, copper tartrate, copper oxalate, derivates thereof and combinations thereof; and

reducing the complexed copper ions with an electrical bias to form the copper seed layer.

24. (Currently Amended) The method of claim 23, wherein the barrier layer ~~is~~ contains a material selected from the group consisting of cobalt, ruthenium, nickel, tungsten, tungsten nitride, titanium, titanium nitride, and silver.

25. (Currently Amended) The method of claim ~~23~~ 24, wherein the ~~copper solution comprises at least one~~ copper source ~~compound selected from the group consisting~~ is copper citrate~~, copper borate, copper tartrate, copper oxalate, copper pyrophosphate, copper acetate, copper EDTA complex and combinations thereof~~.

26. (Currently Amended) The method of claim 24, wherein the electrical bias ~~is configured to~~ generates a current density of less than about 10 mA/cm^2 across ~~the~~ a substrate surface.

27. (Currently Amended) The method of claim 26, wherein the current density is within the range from about 0.5 mA/cm^2 to about 3 mA/cm^2.

28. (Currently Amended) The method of claim ~~14~~ 25, wherein the complexed copper solution has a copper ~~ions have a metal~~ concentration within the range from about 0.02 M to about 0.8 M.

29. (Cancelled)

30. (Currently Amended) The method of claim ~~27~~ 28, wherein the copper seed layer has a thickness of less than about 200 Å.

31. (Currently Amended) The method of claim ~~30~~ 23, further comprising depositing a copper gap-fill ~~copper~~ layer ~~onto the copper seed layer and wherein, depositing the gap-fill layer comprises,~~ by:

~~placing~~ exposing the substrate ~~surface into~~ to a second copper solution~~, wherein the second copper solution includes~~ containing free-copper ions; and

applying a second bias across ~~the~~ a substrate surface~~; and reducing the free-copper ions with the second bias~~ to deposit the copper gap-fill layer onto the copper seed layer.

32. (Currently Amended) The method of claim 31, ~~wherein~~ further comprising depositing a copper bulk-fill ~~copper~~ layer ~~onto the copper gap-fill layer comprises,~~ by:

~~placing~~ exposing the substrate ~~surface into~~ to a third copper solution~~, wherein third copper solution includes the~~ containing free-copper ions; and

applying a third bias across the substrate surface~~; and reducing the free-copper ions with the third bias~~ to deposit the copper bulk-fill layer onto the copper gap-fill layer.

33. (Original) The method of claim 32, wherein at least one leveling agent is added to the second copper solution to form the third copper solution.

34. (New) The method of claim 4, wherein the pH value is within a range from about 4.5 to about 6.5.

35. (New) The method of claim 19, wherein the complexed copper solution has a pH value within a range from about 4.5 to about 6.5.

36. (New) The method of claim 23, wherein the complexed copper solution has a pH value within a range from about 4.5 to about 6.5.